

# **SPECIFICATION**

Docket No. 0544MH-40015

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN that we, Carolyn Faour, Paul Anderson, and Avi Bedi, residing in the State of Texas, have invented new and useful improvements in a

## **SYSTEM AND METHOD FOR HANDLING A UNIT OF WORK**

of which the following is a specification:

## CROSS REFERENCE TO RELATED APPLICATION

1        The present application claims the benefit of priority of US Provisional  
2        application No. 60/158,729, filed October 11, 1999, titled COMMON  
3        FRAMEWORK FOR SYSTEMS THAT MANAGE A UNIT OF WORK THROUGH  
4        ITS LIFE CYCLE.

## BACKGROUND OF THE INVENTION

5        1.        Field of the Invention:

6        The present invention relates generally to computer systems, and more  
7        specifically to a system and method for handling a work item within the system  
8        during that item's lifetime.

9        2.        Description of the Prior Art:

10       Numerous techniques are used to manage work that is to be performed.  
11       How that work is handled depends in part upon the nature of the work. In some  
12       applications, a single work item is worked upon by several different entities,  
13       human or automated systems, at different times. Work of this type is difficult for  
14       existing system to deal with, because keeping up with the work item and its  
15       status is not provided for.

16       An example of such a system would be one associated with a "help desk",  
17       in which requests for assistance are submitted by users, and addressed at  
18       various times by technicians. When a user submits a request for assistance, that

1 request must be tracked as it passes through the system set up to deal with it.  
2 Such a request may be dealt with by a single technician, or it may be routed to  
3 one or more specialists for additional assistance. Such requests are sometimes  
4 referred to as "trouble tickets" in some industries. The trouble ticket must be  
5 maintained, and its status ascertained, until a response to the request is  
6 completed.

7       Most computer systems have trouble gracefully handling this type of work  
8 item. In many cases, dedicated code must be written to enable these items to be  
9 tracked and handled. This is inefficient, because systems that deal with such  
10 work items have many features in common.

11       It would be desirable to provide a system that enabled work items of this  
12 type to be easily handled. It would further be desirable for such a system to be  
13 generic enough that the numerous different business systems could use a single  
14 support system.

## SUMMARY OF THE INVENTION

1        In accordance with the present invention, a system and method for handling  
2        work items creates a work item object for each work item entered into the system.  
3        Each object maintains information regarding its state, and its type. Work items are  
4        maintained in queues, and each work item contains information identifying the  
5        queue it is in. Business processes, which may be controlled by people or  
6        automated modules, take items from queues, and perform actions on them.  
7        Actions modify the state of an item, and can alter its data. An item persists until the  
8        work it represents is completed.

## BRIEF DESCRIPTION OF THE DRAWINGS

1        The novel features believed characteristic of the invention are set forth in the  
2 appended claims. The invention itself however, as well as a preferred mode of use,  
3 further objects and advantages thereof, will best be understood by reference to the  
4 following detailed description of an illustrative embodiment when read in  
5 conjunction with the accompanying drawings, wherein:

6        Figure 1 is a block diagram illustrating a preferred common workflow  
7 domain;

8        Figure 2 is a table identifying the contents of a preferred work item;

9        Figure 3 is a diagram depicting a preferred composite action;

10      Figure 4 is a flowchart outlining a process for handling work items; and

11      Figure 5 is a block diagram illustrating data flows in a preferred embodiment  
12 of the present invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

1        As will be appreciated by those skilled in the art, the detailed implementation  
2        of the preferred embodiment can be made in numerous ways. Preferably, an  
3        object oriented environment is used, as it easily represents the various objects and  
4        methods described below. However, the described system and method can be  
5        used with systems of various types.

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6        The following discussion can be better understood with reference to an  
7        example. The invention is not limited to a system implementing the described  
8        example, but it is used for explanatory purposes only.

9        In a business that assists users with questions regarding products they have  
10      purchased, some technique is needed to track the status of numerous inquiries.  
11      One approach is to provide a "trouble ticket," a document that is passed around  
12      containing the history of resolving the help request, and other information relevant  
13      to the request. This can be conceptualized as a physical document, a piece of  
14      paper, but is implemented as objects in a computer system domain.

15      The trouble ticket, referred to herein generically as a "work item," is  
16      preferably an object in an object oriented computer system. A new work item is  
17      created when a help request is first made, and exists until the request is completely  
18      resolved. The work item can change state, be passed to various personnel at  
19      various locations for handling, and can be modified at various stages. IN addition,

1 actions can be performed at various stages along the way that are not related to  
2 modifying the work item itself.

3 As an example, a user can contact a help line via a web page accessed over  
4 the internet. The user selects a category of problem being encountered, such as a  
5 hardware problem with a certain brand of laser printer. A description of the problem  
6 can be entered by a simple text description, or as a series of responses to  
7 questions posed. When the user has entered the required information, including  
8 identification of the user, a work item is generated that must be routed to technical  
9 support and responded to.

10 The work item can be placed into a queue for technical support for that  
11 particular hardware. Eventually a technician takes the work item from the queue,  
12 and determines whether the problem can be answered based on the information  
13 given. If not, additional handling may be required, or the technician may need to  
14 call or otherwise contact the customer for further information. The work item may  
15 need to be routed between several different people, even several different  
16 companies, before it is resolved. Once the problem has been solved, which can  
17 include on-site repair or replacement, the work item is completed and archived.

18 The preferred system handles the work item and its routing in a manner that  
19 is generic and can be used for numerous different business processes.  
20 Implemented as a software system running on a computer system, Figure 1  
21 illustrates a preferred domain for the system. Domain 10 allows access through  
22 interface 12, which is the published set of methods by which the domain can be

1 accessed. Contained within the domain are a number of composite actions 16,  
2 described below, and work items 16. Numerous other support and other modules  
3 and objects are included in domain 10 as known in the art, but the composite  
4 actions 14 and work items 16 are of primary conceptual interest. All access to the  
5 work items 16 is through the defined interface 12.

6 Figure 2 describes the parts of a work item 16. Each work item 16 has a  
7 Category, which is used to determine, in part, how the work item 16 is handled.  
8 Each work item has a State, which indicates where the work item 16 is in the  
9 business process flow. Typical states could include new, pending, awaiting follow  
10 up, completed, and so forth. A State indicates whether the work item 16 is open or  
11 closed. An open item has been locked by a handler process, and work is being  
12 done on it. A closed item is waiting in a queue for work to be performed.

13 Each work item 16 has a Location. All work items must be located in a  
14 queue, and the location identifies the queue the work item 16 is in. The Creator  
15 and Responsible fields indicate who created the work item 16, and who is  
16 responsible for dealing with it. The Responsible field can change during the course  
17 of handling the work item. The Due field, which may not be used in some cases,  
18 indicates when the problem represented by the work item must be resolved. This  
19 information can be used to, among other things, prioritize work items in a queue.

20 The History field contains a history of all actions that have been undertaken  
21 on this work item 16. Each time the item is amended in any way, or moved to a  
22 different queue, the history field is updated. By reviewing the History entry at any

1 time, the complete sequence of events relating to this work item 16 can be  
2 recreated. The Description field includes a definition of the problem represented by  
3 the work item, and can include text and coded indicators.

4 Figure 3 shows a composite action 14. Each composite action 14 contains a  
5 rule, which is a Boolean expression that gives an answer of True or False. The rule  
6 can be omitted. By linking a series of composite actions together in sequence,  
7 nearly any business process can be defined by using composite actions 14.

8           Three sets of actions are provided. A first set 18 is executed by default  
9 when the composite action has no rule, or when the rule is not evaluated because  
10 of a setting. A second set of actions 20 is executed when the Rule evaluates to  
11 True, and a third set of actions 22 is evaluated when the rule evaluates to False.  
12 These actions are any which can be executed by the system. Typical actions  
13 include sending the work item to a particular queue, sending e-mail or fax  
14 messages to the customer or a technician, and similar types of notifications. The  
15 actions can be more complex, and initiate various actions to be performed by the  
16 system. For example, an action could include access to a database of expert  
17 knowledge about a certain problem, followed by display of suggested solutions to a  
18 technician.

19 In the preferred embodiment, each Rule has three possible outcomes. If  
20 desired, other outcomes can be accommodated, with multi-way logical branching  
21 occurring. Each outcome of the rule evaluation can have a separate set of actions  
22 to be executed, in the manner described above.

1       Figure 4 is a flowchart illustrating the preferred system in action. Initially, a  
2       work item is created 30; a trouble ticket in the help desk example described herein.  
3       When a work item 16 is created, it is assigned a category. Categories are  
4       preferably arranged hierarchically, so that a user can better define the problem by  
5       selecting a lower category. In the previous example of a printer hardware problem,  
6       high level categories can include, for example, hardware and software problems,  
7       with lower levels defining with more precision the type of hardware having the  
8       problem and the nature of the problem itself.

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1       Each category has an associated composite action 14. When a work item is  
2       initially created, the composite action for the associated category is executed on the  
3       work item. Actions may include, for example, an e-mail notification that the work  
4       item has been entered, and an estimate of the delay before it will be handled. The  
5       work item must be initially placed into a queue, so each possible set of actions for  
6       the composite action associated with a category must have an action that places  
7       the work item into a queue 32.

16       At some future time, the work item is extracted from the queue. This can be  
17       done by an application executing automatically, or by a person calling up the work  
18       item through an application operating on her computer. When a work item is  
19       opened, it must be locked so that another application cannot access it. A  
20       composite action is executed on the work item 34, as described above.

21       The composite action can be executed by a technician after reviewing the  
22       work item. For example, after a technician opens a work item relating to a

1 hardware problem with a printer, the technician will take an initial step toward  
2 resolving the problem. In some cases, it may only be necessary to send a  
3 prepared reply to the customer explaining how to deal with a known, common  
4 problem. In others, it may be necessary to initiate a more complicated series of  
5 actions to resolve the problem. For example, it may be that the symptoms,  
6 although appearing to be hardware related, are actually caused by software. The  
7 technician may then need to transfer the work item to a different queue for  
8 processing, and send a notification to the customer that this has happened.

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9 The technician accomplishes activities such as this by selecting an  
10 appropriate action from a menu or other presentation on her computer display. The  
11 selected action then calls the corresponding composite action, which in turn  
12 executes the actions according to the result of its rule. As mentioned previously,  
13 these actions can include modifying the work item, moving it to a different queue,  
14 sending notifications, and so forth. Whenever a composite action is executed, the  
15 work item history is updated to reflect all changes.

16 If the result of the composite action is to change the work item status to  
17 complete 36, the work item is closed 38 and archived. If processing of the work  
18 item is not yet complete it is placed in a queue for future processing.

19 The result of a composite action may be to leave the work item in the same  
20 queue for future handling, or to move it to a different queue. In either case,  
21 processing of the work item is similar. Also, an action in a composite action may be  
22 to execute another composite action. This would result in a sequence of two or

1 more composite actions being executed on the work item with no additional input  
2 from a technician or the customer. By defining the composite actions, a complex  
3 workflow can be performed on the work item in step 34. Generally, eventually the  
4 work item is placed in a queue to await an action or decision to be performed by a  
5 person, but this is not a requirement.

6       Figure 5 illustrates a conceptual data flow that can occur in the system  
7 described above. A work item is initially created by an appropriate process 40 as  
8 described above. Transport of work items within the common workflow domain is  
9 represented by line 42. The work item is placed into one of queues 44, 46, 48.  
10 Eventually, it will be picked up by the associated handler 50, 52, 54, respectively,  
11 and operated upon. Operations by a handler 50 – 54 include the execution of one  
12 or more composite actions. At the end of such execution, the work item is placed  
13 into another queue for further processing. As described above, in many cases the  
14 processing to be performed by a handler executes as the result of a selection made  
15 by a person after deciding how to deal with the work item.

16       Queue 56 is used for holding work items that are completed, and process 58  
17 finishes the task of completing and archiving completed work items. When the  
18 work item has been completely responded to, as defined by the business  
19 processes defined by the composite actions, the work item 16 is placed in queue 56  
20 for final disposal.

21       The described system and method allow for certain types of businesses  
22 processes to be efficiently handled in comparison with prior art systems. A trouble

1 ticket ion connection with a help desk has been described as an example, but  
2 numerous other situations are suitable for the system and method of the invention.  
3 For example, nearly any customer relationship that requires several different people  
4 to wok on could use the described processes. Whenever any piece of work must  
5 be handled by different entities at different times, the described system and method  
6 can usually be defined to handle the process.

7  
8 While the invention has been particularly shown and described with  
9 reference to a preferred embodiment, it will be understood by those skilled in the art  
10 that various changes in form and detail may be made therein without departing from  
the spirit and scope of the invention.